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OBSERVATIONS ON FRESH-WATER INFUSORIA.

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In this communication I shall call attention to some species of the rich and interesting fresh-water infusorial fauna of the Niagara River and its tributaries. As in previous papers read before this Society on these animals, I shall describe a few species which I regard distinct from heretofore known species, and I shall also mention the detection of interesting ones which appear to be identical with European species.

The Niagara River is so constant in volume, supplied by water from the great lakes, and, hence, more constant in temperature, that minute life varies less with the seasons than in smaller streams which go nearly dry in summer and are nearly solid in winter. This river then affords excellent infusorial fishing, even in the winter. I have often attested this by dragging up weeds at that season which contained many sedentary species. The cray-fish and other Crustacea as well as the skins of fishes afford many ectoparasitic forms in winter. There are besides several deep creeks in the vicinity of Buffalo, the level of which is influenced by the river, and these afford most excellent results to one searching for Infusoria, Sponges, Rotatoria, or Polyzoa. The species found along the borders of the river are usually among those from these deep tributaries.

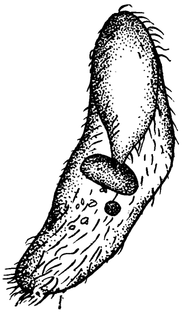
Enchyleodon pellucidus, sp. nov. — Body nearly as broad as long, widest anteriorly, not depressed, hence it is somewhat conical. Often the body shows a constriction at the middle, ends rounded, sometimes concave; body substance pellucid, resembling *Otostoma carteri*, except the more apparent vacuoles which give the endoplasm a cellular or reticular aspect; there are sometimes brown masses of food. Oral aperture an oblong slit with the edges beaded, placed centrally; œsophagus striate and extending backward to near the middle of the body; in one view it is broad and in another narrow or wedge-shaped. The cilia are short, fine, even, arranged in longitudinal lines. Contractile vacuole large, posterior. Length $\frac{1}{130}$ inch.

Among *Myriophyllum* and Algae in river water, Corunna, Mich., I found many in their colorless globular cists, attached to the plants, and saw the animal in several instances crawl out of the same and swim away. It seems that they prepare these shields temporarily. Weeds brought in from ponds that were fast disappearing under the summer's sun afforded cysts in abundance, but after standing a few hours in a small tank on the table at which I worked, many empty cysts and free animals were invariably discovered by an examination.

Enchyleodon farctus. — This wonderful species was taken abundantly in May from among decaying leaves in a forest pool near Buffalo. The larger ones were $\frac{1}{80}$ inch in length, and found to vary greatly in shape with the amount of ingested food; they are generally egg-shaped and quite opaque on account of numerous globular, refractive bodies throughout the endoplasm; the whole animal is of a light brown color; the nucleus is long and twisted; in one animal two of these sinuous bodies were seen. The outline is not quite symmetrical, and the œsophagus is turned slightly to the left and not in the central line as figured by authors.

When the contractile vacuole lies in a favorable position at systole the body walls may be seen thrust out by the outflowing current. I have not been able to witness the rosetted appearance of this organ, but when the animal is partially restrained by the compressorium, it turns and writhes its plastic body, detaching parts of the body itself and breaking the vacuole into parts, these continuing as vacuoles for a long time. The separated portions of the body often move by the cilia brought away with them.

Otostoma carteri was taken sparingly with the preceding. The transparency of its body and the remarkable ramification of the vacuole on contraction render it a wonderfully interesting animal.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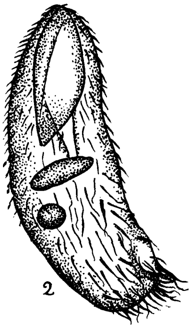
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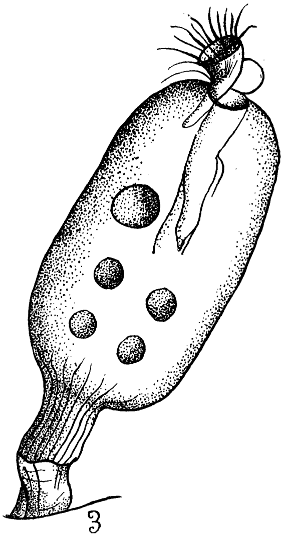
Balantidium gyrans, n. sp. (Figs. 1, 2). Body flattened, three times longer than wide, slightly narrowed at extremities, curved somewhat to the left, plastic; ciliated throughout, cilia long and fine. Endoplasm very fine granular, rarely with bands of brown. Oral area strongly concave, extending back one-third to one-half the length of the body, used as a sucking disk, ovate, narrowest posteriorally. The nucleus is spheroidal, centrally placed. The large, single, slowly pulsating, contractile vacuole is situated near the convex side between the nucleus and the extremity. The posterior extremity is truncated obliquely, and bears a slight, projecting, angular lip beneath on the left hand side; the posterior cilia are more powerful than those on the body. Length $\frac{1}{400}$ to $\frac{1}{370}$ of an inch. Found in the intestinal cavity of an aquatic worm, which was not identified.

This extremely interesting endoparasite is abundant in the species mentioned, especially in the posterior portion of the intestinal cavity. This is a very lively species, and when dislodged and swimming in water mingled with matter from the body of its host, has a habit of going rapidly about a circle, side up, in the direction of the hands of a watch (opposite in the microscope). I have watched one continuously for thirty minutes, spinning at the rate of eighty to ninety revolutions a minute. When doing this it often carries a pellet of matter in the concave disk ; this may be seen to rotate rapidly as the animal slows its speed, showing that the frontal area is ciliated.

The contractile vacuole breaks up at systole into a cluster of smaller ones, and otherwise behaves very much like that



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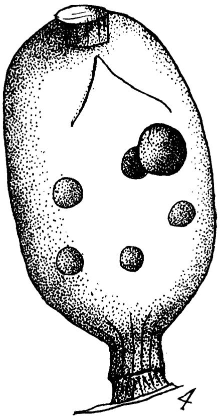

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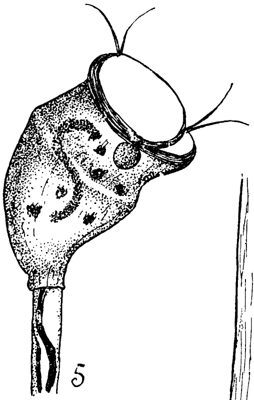
of *Enchyleodon farctus*. The posterior third of endoplasm may be seen partially filled with small vacuoles, especially after the animal has been some time in the water.

Its habit of clinging by the peristome field to the glass cover reminds one of Haptophrya, but its characters appear to ally it to *Balantideum*. When swimming with its side toward the observer the frontal concave area resembles a gaping mouth. Transverse subdivision has been witnessed several times.

Figure 1 was sketched from an example clinging to the glass, ventral side uppermost. Figure 2, dorsal side uppermost.

Pixidium hebes, n. s. (Figs. 3, 4.) Body cylindrical or slightly obconical; the length a little more than twice the width; the anterior extremity obtuse or rounded; posterior in some examples suddenly contracted for a short distance above the pedicle; in others the posterior third of the body tapers to the width of the stalk; surface smooth; endoplasm fine granular inclosing a few coarse particles and vacuoles. Peristome very narrow, convex, lifted well above the crater-like aperture. Contractile vacuole large and situated near the middle of the body. Nucleus not observed. Pedicle



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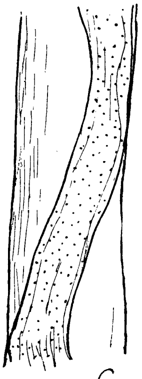

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short, the body when contracted telescoped upon it. Length of body $\frac{1}{236}$ of an inch; width $\frac{1}{520}$ of an inch.

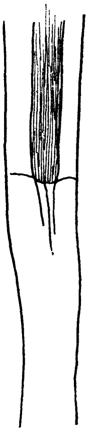
On the legs of *Asellus* from a creek near Fort Erie, Ont., May, 1888. At first it was supposed to be an individual founding a colony of some species of *Opercularia*. But so many were found and no corresponding *Opercularia* appearing with it, I was finally convinced that it was a mature form of the genus *Pixidium.*

Vorticella rubristigma, sp. nov. (Fig. 5, 6.)—Body subcampanulate, slightly nodding when active; the middle is rather abruptly expanded into a ridge-like band, the peristome border is nearly as wide as the length of the body, and conspicuously thickened, collar-like; the disk is wide, moderately elevated, and flat or slightly concave. Endoplasm clear, bearing a few scattered globules. The nucleus is thin, long, and twisted. Solitary. The pedicle is stout and nine times the length of the body. It is characterized by numerous red points attached to the muscle. Length of body $\frac{1}{740}$ inch. Attached to weeds in Shiawasse River, July, 1888.

Picta and Elongata have red dots arranged in a row throughout their pedicles, but in *Rubristigma* there are many rows. *Picta* is social, and the shape and surface of *Elongata* are totally different.

I may mention in this connection frequently observing a thimble-shaped *Vorticella* completely covered with an investment resembling that of *Vestita,* except it was not distinctly cellular, and was filled with rapidly moving points, probably some one of the minute plants which cause or accompany diseased states. This may have been a diseased condition, although the animals were still vigorous.

Zoothamnium arbuscula.— In *The Microscope,* vol. vi, p. 55, occurs a sketch made by myself of the remarkable reproductive zooid of this species. It is forty or more times larger than the normal body, globular, coarsely striate, with the nucleus correspondingly increased in size, and granular.



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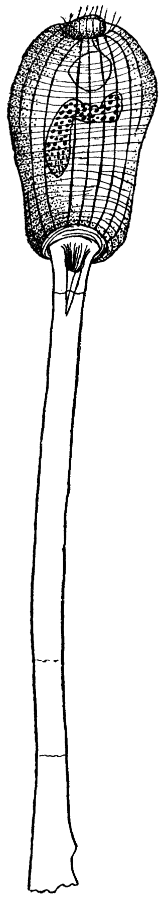

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These bodies I have met with occasionally for years, but have not until recently seen one after its migration while it was establishing a new colony, i. e., in the act of producing the primary pedicle. I have thought a sketch with a note of explanation would be interesting.

The growth of the stalk had proceeded some ways when first observed, but the growth continued with astonishing rapidity until the muscle had reached a length equal to half the length of the body, when it entirely ceased, owing, no doubt, to unfavorable conditions.

The body that doubtless was globular before migration had changed to oblong or melon-shaped; this latter appearance was heightened by several meridional, cord-like bodies shown in the sketch; the surface, the nucleus, and the ciliary disc remain without notable changes. The very large contractile vesicle at collapse usually broke up into numerous small globules which by the continued rotation of the endoplasm were distributed throughout the mass, giving it a vacuoled appearance. At systole I fancied that I could see a passage into the œsophagus. The time of growth of the pedicle from the beginning of the muscle until it equaled the proportion of half the body length was one hour.

Figure 7 represents the appearance soon after the muscle began to form, and figure 8 the same one hour later.

The ordinary zooid and the colonies agree very well with *Z. arbuscula*, as described by authors, but this modified reproductive zooid differs markedly from the figures at hand of that stage of *Arbuscula*. The figures usually represent the muscle as extending downward to the attachment of the pedicle; this organ begins some distance up the stalk in our representatives.

Opercularia Niagaræ, sp. nov.—Body fusiform, elongate, surface smooth; the peristomal edge is thick, cord-like, and the body is strongly contracted beneath it; the peristome is narrow, convex. Above the border there is a thick, secondary fold; the usual peristomal membrane is narrow. Nucleus ribbon-like, placed transversely in the upper part of the body. The contractile vesicle is large and placed in the fold of the nucleus or above that body.

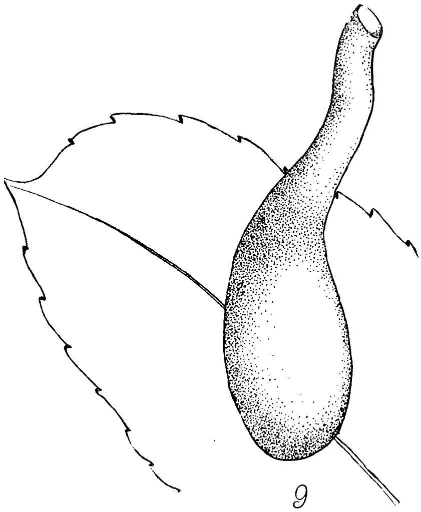
The endoplasm contains many coarse granules and occasionally green bodies. When contracted there is a snout-like prolongation; when partially contracted the anterior part is strongly fluted.

The pedicle long, much branched, bearing large colonies, surface finely striate transversely. Length of body $\frac{1}{154}$ inch. Found on various aquatic animals in the Niagara River and its tributaries.

I consider this a perfectly distinct species of the genus; the zooids resemble somewhat those of *O. rugosa* but examination discloses marked differences, *e. g.*, the peculiar secondary fold of the peristomal border, and the position of the contractile vesicle in the extreme anterior part of the body; this is a characteristic separating it from all other species known to me; this organ in all species I have studied is situated low down in the body.

The rock bass of streams entering the Niagara is infested with the crustaceous parasite *Lerneocera cruciata*, and on these this *Opercularia* very generally abounds.

The species is rather hardy, living in stale water without food long after other Vorticellidæ have perished, but under unfavorable conditions they finally lose the power of contracting their bodies, and when in this condition I have frequently witnessed the strange phenomenon of crowds of rod-like bacteria writhing about the peristome evidently eager to begin the work of reducing their bodies.



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Stichotricha.— I have met with three distinct tube-making species of the genus. The first I will mention is, I think, *S. secunda*, Stein; its adnate, brownish, fluccose tubes are not uncommon at Buffalo and at Corunna, Mich. The second, not so common, occurs at both places mentioned, usually on *Sphagnum;* it is *S. remex*, Hudson; it is social, and often many tubes are found associated on a single leaf. The third form appears to be undescribed, so I will name it, and give an account of it so far as its characters were made out.

Stichotricha ampulla, sp. nov. (Fig. 9). — The case consists of an ovate, deep-brown sack, adnate upon its support, and a neck-like prolongation which is free, as long as the sack, translucent, straight or curved; the length of the whole case is $\frac{1}{130}$ inch.

The animal is attenuate, slightly more pointed anteriorly, protruded for half its length in the usual spiral for about one and a half turns. The long, adoral cilia decrease in length towards the apex. (The setæ have not been fully made out.)

The contractile vesicle is large and egg-shaped, placed near the center of the body very close to the oral aperture.

The animal has no strong characteristics to separate it from *secunda*, and yet it is clearly distinct. It is more elongate and the adoral cilia increase in length toward the aperture instead of apically; the contractile vesicle is similarly placed, but differs in shape. I have not been able to dislodge one for study.

It occurs in Black Creek, Ontario, on *Myriophyllum*, and in the Shiawassee River, Corunna, Mich., on the same and on moss.